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ALABAMA-COOSA RIVER BASIN HOWELL MILL SHOALS RESERVOIR: REPORT ON EFFECTS OF PROPOSED RESERVOIR ON POLLUTION PROBLEMS IN ALABAMA-COOSA RIVER BASIN

Robert P. Morfitt, et al

Environmental Health Center
Cincinnati, Ohio

July 1951

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HOWELL MILL SHOALS RESERVOIR

Report on Effect of Proposed Reservoir on Pollution Problems in Alabama-Coosa River Basin

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Report on Effects of Proposed Reservoir on Pollution Problems in Alabama-Coosa River Basin

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Prepared by U. S. Public Health Service
at the request of and in cooperation with the
District Engineer, U. S. Engineers Office
Mobile, Alabama

I

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INTRODUCTION

The Office of the District Engineer, Mobile District, Corps of Engineers, in a letter dated 10 April 1951, requested that the U. S. Public Health Service prepare a memorandum report on the possible benefits to pollution abatement which might result from low-water regulation in the Alabama-Coosa River, due to the operations of the proposed Howell Mills Shoals Reservoir. The work was to be done on a reimbursable basis, with expenses incurred being paid by the District Engineer, Mobile District.

Studies of the Alabama-Coosa River Basin were conducted by the State of Alabama, Water Improvement Advisory Commission, in 1948-49. The results of these studies are to appear in a report, "Studies of Pollution in Streams of Alabama", by the State of Alabama, which is to be published at an early date. The stream quality data presented in this report form an important basis for the study conducted by the U. S. Public Health Service.

The investigation has been carried out with the close cooperation of the Alabama State Health Department and the Mobile District Corps of Engineers.

A summary of the pertinent data for the Howell Mill Shoals Development on the Coosa River as recommended by the U. S. Engineers Office in its comprehensive plan for water control for the Alabama-Coosa River basin is shown in Table I.

SUMMARY AND CONCLUSIONS

(1) There are six domestic water supplies taking 6.9 M.G.D. of water from the Coosa River and three industrial establishments utilizing 161.5 M.G.D.

(2) There are no water supplies taken from the Alabama River.

(3) The total pollutional load discharged to Coosa River Basin has a sewered population equivalent of at least 257,000, of which 50% is due to industrial waste.

(4) The total pollutional load discharged to the Alabama River Basin has a sewered population equivalent of at least 145,000. A population equivalent of 118,000 or approximately 80% of the total load, is discharged in the vicinity of Montgomery, Alabama.

(5) Laboratory results collected by the Alabama Department of Health showed that at no point during the survey period did the average D. O. content of the main stem of the Coosa or the Alabama River fall below 5.4 p.p.m.

(6) In the opinion of the Alabama Department of Public Health the main stems of the Coosa and Alabama Rivers are at present capable of disposing of their present pollutional load without nuisance or detrimental effect on present water usages.

(7) With the future anticipated industrial and agricultural development and probable change in water usages, the water quality of the Coosa may not remain satisfactory without the construction of adequate sewage and industrial waste treatment facilities. In the future when this becomes necessary, increased low-water flows may reduce the degree of waste treatment required.

(8) The water supply for Pell City and vicinity will be affected by the backwater from the proposed Howell Mill Shoals Dam.

(9) In order to fully utilize the recreational facilities of the proposed reservoir area, the cities of Attalla and Gadsden, will be required to install adequate sewage treatment facilities.

DESCRIPTION

The Coosa River flows approximately 286 miles from its source at the confluence of the Oostanaula and Etowah Rivers at Rome, Georgia, to its junction with the Tallapoosa River some fifteen miles above Montgomery, Alabama. Here these two rivers form the Alabama. The Alabama, in turn, flows in a southeasterly direction some 320 miles and terminates at its junction with the Tombigbee some 45 miles above Mobile, Alabama.

The drainage area of the Alabama and Coosa Rivers (excluding the drainage of the Cahaba and Tallapoosa Rivers) from the confluence of the Alabama and Tombigbee to the origin of Coosa River at Rome, Georgia, is some 12,000 square miles. Approximately 92 per cent is in Alabama and the remaining 8 per cent in Georgia.

Agriculture and industries share equally in the economy of the basin. The principal agricultural products are cotton, corn, cattle, dairy products, and timber. The major industrial activities include the production of textiles and apparel, lumber and wood products, and primary metals.

The major urban centers within the area and their 1950 populations are as follows:

NAME	POPULATION (1950)
Montgomery, Alabama	105,098
Gadsden, Alabama	55,528
Rome, Georgia	32,000
Anniston, Alabama	31,150
Selma, Alabama	22,629

The proposed Howell Mill Shoals Dam will be located in St. Clair and

Talladega Counties, Alabama, on the Coosa River about 106 miles above the mouth. Initially, the dam will provide power and flood control with provisions for a future lock. A summary of pertinent data is shown on Table I.

The U. S. Weather Bureau normal air temperature for Montgomery and Anniston are summarized in Table II.

TABLE I

SUMMARY OF PERTINENT DATA, HOWELL MILL SHOALS DEVELOPMENT

Howell Mill Shoals Reservoir Investigation

Stream Flow	
Miles above mouth of Coosa River	106
Drainage area of dam site - square miles	7,716
Maximum flow of record - cfs	118,000
Minimum flow of record - cfs	1,200
Average annual flow - cfs	12,600
Minimum monthly flow - cfs	1,295
Regulated flow - cfs	3,270
Maximum stage of record (Nov.1948) estimated	432.1
Reservoir	
Flood control pool elevation - feet above msl	510
Power pool elevation - feet above msl	505
Minimum power pool elevation - feet above msl	485
Maximum tailwater elevation - feet above msl	433.8
Average tailwater elevation - feet above msl	415
Reservoir area at elevation 510, acres	80,000
Reservoir area at elevation 505, acres	70,300
Reservoir area at elevation 485, acres	37,500
Power Plant	
Maximum static head - feet	99
Average operating head - feet	83.5
Minimum operating head - feet	70.5
Installation 4 units @ 45,000 kw	180,000

(Source: Project Summary, Corps of Engr., Mobile Dist.)

TABLE II

MONTHLY MEAN AIR TEMPERATURES - 1949

Howell Mill Shoals Reservoir Investigation

Month	Air Temperature Degrees Fahrenheit Anniston, Alabama (airport)	 Montgomery, Alabama (city)
January	52.6	57.0
February	51.8	56.9
March	53.0	57.8
April	59.3	63.8
May	70.9	75.2
June	76.4	79.1
July	80.2	81.6
August	78.5	80.6
September	70.8	75.1
October	68.2	72.0
November	49.0	55.9
December	46.6	51.8
Annual	63.1	67.3

Source: U. S. Weather Bureau Report

SURVEY METHOD

In view of the fact that rather complete analytical records have been collected by the State of Alabama Health Department on water quality data for the Alabama-Coosa River, a comprehensive field investigation was not considered necessary for present purposes. The present investigation has consisted primarily of the assembly, tabulation, presentation, and study of existing data. The following types of information have been tabulated and analyzed:

(1) Air temperature records

(2) Data on sources of pollution

(3) Data on surface water supplies

(4) Laboratory data

(5) Hydrometric data

A reconnaissance trip was made of the basin and consultations were held with State officials for the purpose of obtaining data and bringing all existing information up to date.

PRESENTATION OF DATA

Water Supplies

There are six domestic water supplies taking 6.9 mgd of water from the Coosa River. These systems serve an estimated 72,000 persons. There are, in addition to these surface supplies, two underground supplies (springs), which will be affected by the proposed development. There are no water supplies taken from the Alabama River.

Three industrial establishments utilize 161.5mgd of Coosa River water in the operation of their plants.

Table III summarizes the data on public and industrial supplies. Water taken from tributary streams, wells, or spring (except the two supplies mentioned above), are not included in this table as they are of no pertinent in-

terest in this investigation. Data included in Table III were obtained from the "Inventory of Water and Sewage Facilities in the United States," compiled by the U. S. Public Health Service, revised and brought up to date by the River Basin Office of the Public Health Service and the Alabama Department of Public Health.

TABLE III

SURFACE WATER SUPPLIES
Howell Mill Shoals Reservoir Investigation

Supply	Source	Mile(1)	Population Served	Average Consumption mgd	Treatment(2)
			Domestic		
Center	Coosa River	219	1,200	0.063	F
Gadsden	" "	175	65,000	6.500	F
Pell City	Springs(3)	123	950	0.100	D
Avondale Mills (Pell City)	Springs(3)	123	600	0.350	D
Oak Ridge(4)		123	750	0.040	D
Howell Mills Shoals Dam Site		106			
Mitchel Dam	Coosa River	36	40	0.010	F
Lay Dam	" "	51	65	0.012	F
Jordan Dam	" "	18	80	0.012	F
Wetumpka	" "	10	5,000	0.272	F
Total Domestic			73,685	7.347	
			Industrial		
Republic Steel Corporation	Coosa River			65.000	N
Newsprint Company	" "				N
Process				23.000	
Cooling				39.000	N
Beamnit Mill (rayon)	Coosa River				
Process				8.500	N
Cooling				26.000	N
Total Industrial				161.500	
Total Surface Water Supplies				168.847	

(1) Mile - above mouth of Coosa River
(2) F - Coagulation, Sedimentation, Filtration & Chlorination
D - Chlorination
N - Unknown
(3) Underground Supplies affected by proposed development
(4) Dependent upon Avondale Mills

Sources of Pollution

Tables IV and V summarize the significant sources of organic pollution, including industrial wastes, in the Coosa River Basin. There are 49 sources of pollution consisting of the discharge from 37 municipal sewer systems and 12 industries discharging through separate outlets. The total pollutional load prior to treatment has a sewered population equivalent of 292,000 of which approximately 50% is due to industrial waste. The total pollutional load is reduced from 292,000 to 257,000 by the operation of 23 sewage treatment plants.

Tables VI and VII summarize the sources and amounts of domestic and industrial pollution in the Alabama River Basin. There are 17 sources of pollution consisting of the discharge from 15 municipal sewer systems and 2 industries discharging through separate outlets. The total known organic load discharged to the basin watercourse has a population equivalent of approximately 145,000.

The greatest concentration of waste discharged in the Alabama River Basin is centered around the city of Montgomery, Alabama. Here there is discharged a pollutional load with a population equivalent of at least 118,000, or more than 80% of the total pollutional load of the river basin.

Laboratory Results

Tabulations of the laboratory data and location of sample points are presented in Appendix Tables A-1 and A-2. This stream quality data is a portion of the information obtained from the State of Alabama Department of Public Health. Data on tributary streams are not included in Table A-1 as increased flows in the Coosa will have little effect on pollution abatement of tributary streams. For complete presentation of laboratory data see, "Studies of Pollution in Streams of Alabama," by State of Alabama Water Improvement Advisory Commission.

SOURCES OF POLLUTION, MUNICIPAL,[1] COOSA RIVER
Howell Mill Shoals Reservoir Investigation

Stream / Municipality	Miles above Mouth: Coosa	Miles above Mouth: Trib.	Sewered Population	Treatment	Sewered Population Equivalent (P.E.D.): Untreated	Sewered Population Equivalent (P.E.D.): Discharged
Coosa River						
Center	219		750	None	750	750
Terrapin Creek	219					
Piedmont (5)		20	4,500	Pri.	4,500	2,950
Coosa River						
Gadsden (3)	171		40,000	None	40,750	40,750
Attalla	170		5,000	None	5,025	5,025
Big Wills Creek	172					
Fort Payne		46	5,400	Sec.	5,575	840
Armuchee	167					
Allie Chalmers		2	700	Sec.	700	110
Big Canoe Creek	155					
Springville		25	350	Pri.	350	225
Ashville		17	250	Pri.	250	175
Talladega Creek	143					
Jacksonville		22	1,600	Pri.	1,600	1,100
Canoe Creek	141					
Fort McClellan		19	500	None	500	500
Blue Mountain		19	575	Sec.	575	90
Ore Creek	117					
Avondale		6	1,200	Pri.	1,200	800
Pell City		2	800	Pri.	800	525
Howell Mill Shoals Dam Site						
Choccolocco Creek	115					
Anniston		12	32,000	None	33,400	33,400
Oxford		12	1,200	None	1,200	1,200
Hymon (3)		10	3,000	Sec.	3,000	450
Talladega Creek	88					
Bemiston		24	1,100	Pri.	1,100	725
Talladega (3)		20	11,500	Sec.	11,500	1,725
Talladega Creek	86					
Sycamore		15	1,200	Pri.	1,200	800
Sylacauga		13	11,000	Sec.	11,550	1,750
Ben Air		4	400	Pri.	400	275
Childersburg		3	3,500	Pri.	3,500	2,300
Wazahatchee Creek	55					
Columbiana		17	1,150	Pri.	1,150	750
Caleria		7	750	Pri.	750	500
Coosa River						
Lay Dam	50		60	None	60	60
Walnut Creek	43					
Clanton		10	3,000	None	3,350	3,350
Hatchett Creek	42					
Goodwater		15	650	None	650	650
Coosa River						
Mitchell Dam	36		40	None	40	40
Jordan Dam	19		70	None	70	70
Tutwiler	12		50	None	350	350
Wetumpka	5		2,350	None	2,350	2,350
Hatter Creek	3					
Speigner		3	700	Sec.	700	110
TOTAL			134,645		138,895	104,695

(1) - Includes incorporated and unincorporated municipalities, and other legal bodies such as sanitary districts.

(2) - Includes industrial wastes discharged into municipal sewage systems.

(3) - 2 separate sewer systems.

(4) - 3 separate sewer systems.

Source: "Studies of Pollution in Streams of Alabama," State of Alabama.

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TABLE V - INDUSTRIAL[1] SOURCES OF POLLUTION - COOSA RIVER
Howell Mill Shoals Reservoir Investigation

Location	Industry	Ind. Waste Est. Pop. Equiv. B. O. D.	Receiving Stream	Miles Above Mouth Coosa	Trib.
Gadsden	Coke	35,000	Black Creek	171	3
Ft. Payne	Textile	500	Big Wills Cr.	172	46
Attalla	Textile	900	Big Wills Cr.	172	9
Blue Mt.	Textile	375	Branch	141	19
Anniston	Textile	100	Snow Creek	115	32
Pell City	Textile	4,200	Dye Cr.	117	6
Talladega	Textile	1,750	Talladega Cr.	88	20
Bemiston	Textile	200	Talladega Cr.	88	24
Sylacauga	Textile	11,000	Fallaseehatchee	86	13
Childersburg	Sulfate Pulp	70,000[2]	Coosa River	86	
	Newsprint Textile	28,000[2]	Coosa River	86	
Wentumpka	Textile	1,100	Coosa River	11	
Total		153,125			

(1) Industries discharging directly to the basins watercourses.

(2) Estimated from information obtained from State of Alabama.

Source: "Studies of Pollution in Streams of Alabama", State of Alabama

SOURCES OF POLLUTION, MUNICIPAL,[1] ALABAMA RIVER

Howell Mill Shoals Reservoir Investigation

Stream Municipality	Miles above Alabama	Mouth Trib.	Sewered Population	Treatment	Sewered Population Equivalent[2] (B.O.D.) Untreated	Discharged
Branch	308					
Gunter-Kilby		2	8,500	None	8,500	8,500
Alabama River						
Montgomery	300		32,000	None	38,950	38,950
Maxwell	297		5,000	None	5,000	5,000
Autauga Creek	287					
Prattville		4	3,000	None	3,900	3,900
Cantoma Creek						
Montgomery			55,000	None	55,750	55,750
Big Mulberry Creek	235					
Thorsby		50	550	Pri.	550	350
Alabama River						
Craig Field	221		1,700	None	1,700	1,700
Selma	218		6,000	None	6,000	6,000
Selma	216		7,000	None	7,000	7,000
Boguechetto Creek	173					
Marion (1)		45	850	None	850	850
Marion (2)		45	300	None	300	300
Pursley Creek	126					
Camden		10	300	Pri.	300	200
Limestone Creek	80					
Monroeville (1)		13	800	Pri.	800	525
Monroeville (2)		20	700	Pri.	1,025	675
Lovells Creek	65					
Frisco City		10	575	Pri.	575	375
TOTAL			122,275		131,200	130,075

1 - Includes incorporated or unincorporated municipalities, and other legal bodies such as sanitary districts.

2 - Includes industrial wastes discharged into municipal sewage systems.

SOURCE: "Studies of Pollutions in Streams of Alabama", State of Alabama.

Table VII

INDUSTRIAL* SOURCES OF POLLUTION, ALABAMA RIVER
Howell Mill Shoals Reservoir Investigation

Location	Industry	Industrial Waste Est. Pop. Equiv. B. O. D.	Receiving Stream	Miles above Alabama	Mouth Trib.
Montgomery	Meat	9,750	Ditch	300	2
Selma	Meat	5,000	Ditch	218	
Total		14,750			

* Industries discharging directly to the basin watercourses.

SOURCE: "Studies of Pollution in Streams of Alabama," State of Alabama.

Hydrometric Data

In stream pollution studies, low summer flows are of major interest because of the critical dissolved oxygen which may occur due to the combination of a pollutional load with low flows and high water temperatures. For this reason, a brief study has been made on the recurrence interval of low stream flows for the period of record. Both monthly and daily low flow frequencies have been computed and are summarized in Table VIII. In computing the low monthly flow frequency, the lowest monthly flow of each year of record is used. Similarly, in computing the minimum daily flow frequency, the lowest daily flow of each year of record is used.

TABLE VIII

LOW FLOW FREQUENCY

Howell Mill Shoals Reservoir Investigation

Stream	Gage	Period of Record (Years)	Min. Flow (cfs)	Flows Estimated to Recur Once in (Years) 20	10	5	3	2
			Frequency of Minimum Daily Discharges					
Coosa River	Childersburg Alabama	32	1300	1350	1700	2100	2400	2650
Alabama River	Montgomery Alabama	20	2420	3700	4400	5200	5800	6300
			Frequency of Low Mean Summer Monthly (June-Oct.) Discharges					
Coosa River	Childersburg Alabama	32	1400	1450	2100	2600	3100	3600
Alabama River	Montgomery Alabama	20	6600	6600	6900	7600	8300	8900

TABLE IX

STREAM FLOW CHARACTERISTICS

Howell Mill Shoals Reservoir Investigation

Stream	Alabama River	Coosa River
Location	Montgomery Gage	Childersburg Gage
Period Considered	Oct. 1927 to Sept. 1947	Feb.1914 to Sept.1947
Drainage Area (Square Miles)	15,100	8,390
Average Annual Flow (Second - Feet)	23,610	(1917-1947) 13,770
Average Monthly Flow (Second - Feet)		
June	14,400	8,380
July	13,210	7,750
August	13,060	6,690
September	10,070	4,570
October	10,550	4,700
November	13,860	7,100
Single Month Minimum (Second - Feet)		
June	6,900	3,070
July	7,550	3,320
August	7,370	1,990
September	7,200	1,400
October	6,600	1,610
November	5,483	2,230
Daily Minimum (Second - Feet)		
June	4,020	2,510
July	4,670	2,290
August	4,140	1,500
September	4,140	1,300
October	3,300	1,340
November	2,420	1,680

SOURCE: Compiled from U. S. Geological Survey Water Supply Papers.

DISCUSSION

The principal objective of pollution control activities is to maintain a water quality which will be satisfactory for all normal water usage. The criteria of quality usually considered include the bacterial density, pH, dissolved oxygen content, absence of oils and floating solids, and the absence of excessive toxic and taste and odor producing compounds. Increased low-water flows provide additional dilution, under critical conditions, for the wastes received by a stream and thus help to maintain desirable conditions in the stream. In the Coosa River basin, the most important measure of stream quality is the dissolved oxygen content. For the purpose of this study, a minimum dissolved oxygen content of 5 ppm was selected. This is believed to be the minimum oxygen level for the proper maintenance of a balanced aquatic life.

Normal Expected Flows

Frequently it is not economically feasible to design waste treatment facilities to maintain the desired conditions under absolute minimum stream flow conditions. It is recognized that a drop in the dissolved oxygen content in a stream below the desired minimum for a short period of time is sometimes permissible, although not desirable. For this reason the normal expected flows used in this study have been taken as the minimum daily flow which is equaled or exceeded, on the average, nine years in ten. For the Coosa River at Childersburg and the Alabama River at Montgomery, these flows are 1700 and 4400 c.f.s. respectively.

Present Conditions

The results of the chemical, physical, and bacteriological analyses of the survey conducted by the Alabama Water Improv. Advis. Comm. show that the Coosa and Alabama Rivers, at the time of sampling, were capable of disposing of their pollutional load without nuisance or detrimental effect on present water usages.

During the period of sampling, the average water temperature of the Coosa River was 26°C. The dissolved oxygen content of Coosa River for a reach free of any significant pollutional effect averaged 85% of saturation.

A. Coosa River - The Coosa River, due to the location and magnitude of pollution, may be considered in four reaches:

1. Gadsden-Attalla and vicinity
2. Poll City to Lay Lake
3. Lay, Mitchell, and Jordan Lakes
4. Wetumpka to mouth of Coosa

Due to industrial wastes and domestic sewage discharged in the vicinity of Gadsden the average dissolved oxygen content of the Coosa at the confluence of Big Wills Creek is reduced to about 50% of saturation at flows of 4000 cfs. However, at a point 3 1/2 miles below the mouth of the creek, and above the headwaters of the proposed impoundment, the stream has fully recovered its normal oxygen content (about 85% of saturation). The Gadsden-Attalla area, being above the proposed reservoir site, will not receive any pollutional benefits due to increased low-water flows.

At the time ofsampling, the waters impounded by Lay, Mitchell and Jordan Dams were well within the bacteriological limits of most of the standards for natural bathing waters. The average coliform density immediately above Lay Dam was 3.0 per millilitor and decreased to an average density at Jordan Dam of 1.3 per milliliter. The dissolved oxygen content of the lake waters remained satisfactory throughout the period of sampling.

Table X summarizes the dissolved oxygen content occurring at various flows for the reaches from Poll City to Lay Lake and from Wentumpka to mouth of Coosa River. These dissolved oxygen values are the lowest value occurring within the reach for the given flow. Included is an estimated dissolved oxygen value which

might be expected at the low flow of 1700 c.f.s.

From table X it is apparent that the critical reach is Pell City to Lay Lake. Here the low dissolved oxygen values occur in the vicinity of Childersburg. It may be noted that low flows of 1700-2000 c.f.s. just maintained the desired minimum dissolved oxygen content.

Table X - Dissolved Oxygen Values Coosa River
Howell Mill Shoals Reservoir Investigation

	Q cu.ft./sec.	Dissolved Oxygen p.p.m.
Pell City to Lay Lake	6,200	7.0
	4,000	6.3 (1)
	3,000	6.2 (1)
	2,000	Greater than 5.0 (2)
	1,400	Greater than 4.5 (2)
Wetumpka & vicinity	20,000	6.8
	7,000	6.3 (1)
	6,000	6.4 (1)
	4,000	6.0
	3,000	6.2 (1)
	2,000	5.8
	1,700	Greater than 5.0 (2)

(1) Average value for given Q.

(2) Estimated by method outlined in "Simplified Dissolved Oxygen Computation" by M. LeBosquet and E. C. Tsivoglou. Sew. & Ind. Waste, Vol. 22, No. 8, Aug., 1950.

Under present stream flow conditions, the waters of the Coosa River are satisfactory for all present water usage. These flow conditions assume that, although water quality is within the desirable limits of dissolved oxygen with flows of 1700-2000 c.f.s., this flow is not expected to occur any less often than once in 10 years. If, due to

water regulation, a minimum flow of 2000 c.f.s. were permitted to recur several days in succession at frequent intervals, the effect would be detrimental to water quality of the Coosa River.

B. Alabama River - The only critical stretch, from a pollution standpoint, of the Alabama River is the reach in the vicinity of Montgomery, Alabama. The river in this reach receives 80% of the total pollutional load of the Alabama River basin. During the period of study the dissolved oxygen content of the river below Montgomery did not fall below 5.4 p.p.m. It is estimated that at a minimum flow of 5000 c.f.s. the dissolved oxygen content of the stream will remain greater than 5 p.p.m. The effect of increased low water flow by Howell Mill Shoals Dam will have no present tangible benefits on pollutional abatement in the Alabama River basin.

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Future Development

The Alabama-Coosa River basin, because of its potentialities, was selected as one of the "Ten Rivers in America's Future" by the President's Water Resources Policy Commission. Intensive use of the land resources will bring increased production of forest and farm crops. Future hydroelectric development of the Coosa River will provide abundant power to stimulate future industrial growth.

The city of Birmingham, Alabama, may, in the future, utilize the Coosa River as a source of water. It is estimated that 200 M.G.D. will be required.

Examples of industrial development may be cited in the recent completion of a newsprint paper mill and a rayon mill located in the vicinity of Childersburg. These plants were placed in operation in 1950 and consequently the effects of wastes from their operation were not included in the 1948-1949 river survey. However, it is believed that at minimum flow these plants should not deplete the dissolved oxygen content of the Coosa by more than 1 p.p.m. over those observed

at the time of survey.

As has been shown previously, under the topic of "Present Conditions," the Coosa at minimum flow is just capable of disposing of its present pollutional load. However, with the future anticipated development and probable change in water usage, the water quality of the Coosa may not remain satisfactory without the construction of adequate sewage and industrial waste treatment facilities. In the future, when this becomes necessary, any increase in low flows may reduce the degree of waste treatment required.

Backwater Effects

It is anticipated that the proposed reservoir area will be developed as a recreational area similar to Lay, Mitchell and Jordan Lakes. Results of the Alabama Health Department field survey show average coliform counts (M.P.N.) in the reach of the Coosa River within the proposed impoundment of greater than 10,000 per 100 ml. In order that the recreational use of the proposed reservoir may be fully developed, the cities of Attalla and Gadsden will be required to provide primary treatment with chlorination of the effluent during the bathing season.

The water supplies for Pell City and vicinity, now taken from springs, will be affected by backwater from the proposed Howell Mill Shoals Dam. This may require the communities to go elsewhere for a source of potable water, or provide treatment for Coosa River water.

Intangible Benefits

There are numerous intangible benefits derived from increased low water flow which because of their nature cannot be monetarily evaluated. These include, among others, the benefits to aquatic life and recreation, and indeterminate values to the public health.

APPENDIX

PART A-1

GADSDEN, ATTALLA & VICINITY

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			July 20, 1948					
C-18	182.7	----	--	---	----	---	--	---
C-19	176.4	4000	28	7.1	90.6	---	93	7.3
C-20	175.1	4000	28	7.0	88.4	1.2	93	7.3
C-21	173.7	4000	28	6.8	85.8	1.7	91	7.3
C-36	172.0	4400	28	6.5	82.1	3.0	2400	7.1
C-37	171.4	4400	28	5.4	68.2	1.1	1500	7.0
C-38	168.5	4400	28	7.0	88.4	1.8	150	6.9
C-39	162.7	----	--	---	----	---	----	---
C-44	-----	----	--	---	----	---	----	---
C-45	-----	----	--	---	----	---	----	---
			August 2, 1948					
C-18	182.7	----	--	---	----	----	----	---
C-19	176.4	7400	27	6.8	84.3	1.0	15	7.1
C-20	175.1	7400	27	6.6	81.7	2.0	23	7.2
C-21	173.7	7400	28	6.8	85.8	1.7	43	7.2
C-36	172.0	8500	28	5.8	73.2	3.1	11,000	6.5
C-37	171.4	8500	27	6.6	81.7	2.1	2,400	6.5
C-38	168.5	8500	26	6.6	80.3	1.8	----	7.1
C-39	162.7	----	--	---	----	---	-----	---
C-44	152.4	----	--	---	----	---	----	---
C-45	146.6	----	--	---	----	---	----	---
			August 12* - 13, 1948					
C-18*	182.7	4500	25	7.4	88.1	1.6	21	7.0
C-19	176.4	4300	25	7.1	84.5	2.0	43	7.2
C-20	175.1	4300	5	7.2	85.8	1.7	15	7.3
C-21	173.7	4300	25	7.1	84.5	0.8	23	7.3
C-36	172.0	4500	25	7.0	83.4	1.0	1500	7.2
C-37	171.4	4500	26	6.6	80.3	1.4	430	7.1
C-38	168.5	4500	24	6.8	79.7	1.7	----	7.0
C-39*	162.7	4800	26	7.7	93.7	2.9	150	7.1
C-44*	152.4	4800	26	6.5	79.0	2.1	75	7.0
C-45	146.6	----	--	---	----	---	----	---

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GARDEN, ATTALLA & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 16 - 17*, 1948					
C-18*	182.7	4000	25	7.2	85.8	1.4	39	7.4
C-19	176.4	4200	25	7.2	85.8	2.2	9.1	7.3
C-20	175.1	4200	25	7.4	88.1	1.9	15.0	7.3
C-21	173.7	4200	25	7.2	85.8	1.2	43	7.3
C-36	172.0	4400	26	1.6	19.5	6.8	230	6.3
C-37	171.4	4400	25	6.8	81.0	1.4	2400	6.1
C-38	168.5	4400	25	6.8	81.0	0.7	150	6.8
C-39*	162.7	4300	--	6.5	----	1.0	1100	7.1
C-44*	152.4	4300	--	6.4	----	3.0	23	7.4
C-45	146.6	5000	25	6.0	71.5	1.8	28	7.4
C-45*	146.6	4800	26	6.4	77.8	1.6	23	7.3
			August 18, 1948					
C-18	182.7	4300	26	6.7	81.5	0.5	210	7.2
C-19	176.4	4400	25	7.0	83.4	0.2	93	7.3
C-20	175.1	4400	25	7.2	85.8	0.3	9.1	7.3
C-21	173.7	4400	25	6.9	82.1	0.3	93	7.2
C-36	172.0	4600	26	1.0	12.2	3.8	150	7.1
C-37	171.4	4600	25	6.4	76.2	2.5	150	7.2
C-38	168.5	4600	25	6.6	78.6	0.5	230	7.2
C-39	162.7	4600	26	6.7	81.5	0.9	230	7.1
C-44	152.4	4600	27	6.5	80.5	1.2	150	7.2
C-45	146.6	4700	27	7.0	86.8	2.4	240	7.3
			August 19, 1948					
C-18	182.7	3900	26	7.6	92.4	1.0	23	7.3
C-19	176.4	----	--	---	----	---	---	---
C-20	175.1	3900	25	7.3	87.0	0.1	9.1	6.0
C-21	173.7	3900	26	7.1	86.3	0.3	23	7.2
C-36	172.0	4100	28	3.0	37.8	5.0	430	6.4
C-37	171.4	4100	25	6.4	76.2	0.3	270	7.1
C-38	168.5	4100	25	6.8	81.0	0.4	91	6.7
C-39	162.7	4100	27	6.6	81.7	1.9	91	7.1
C-44	152.4	4100	28	6.4	80.8	1.1	93	7.2
C-45	146.6	4800	27	5.8	71.9	2.0	43	7.4

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GADSDEN, ATTALLA & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 20, 1948					
C-18	182.7	3700	26	7.4	90.0	1.3	9.1	7.3
C-39	162.7	3800	25	5.3	75.0	0.9	230	7.2
C-44	152.4	3800	26	6.4	77.8	1.2	39	7.1
			August 22* - 23, 1948					
C-18	182.7	3100	28	7.4	93.4	1.1	----	7.3
C-38*	168.5	3100	28	6.2	78.3	1.3	240	6.8
C-39	162.7	3300	27	7.4	91.6	1.7	430	7.2
C-44	152.4	3300	27	6.0	74.4	1.1	240	7.1
			August 27, 1948					
C-18	182.7	3000	28	6.2	78.3	1.7	93	7.4
C-20	175.1	3000	28	6.2	78.3	1.7	----	7.3
C-21	173.7	3000	28	6.2	78.3	1.3	3.6	7.3
			August 30, 1948					
C-20	175.1	2800	29	7.3	93.9	3.3	15	6.0
C-21	173.7	2800	28	7.4	93.4	2.5	9.1	7.1
C-36	172.0	2900	29	6.2	79.7	3.4	4600	7.5
C-39	162.7	2900	30	6.6	86.5	1.4	210	7.3
			September 7, 1948					
C-20	175.1	2700	25	7.5	89.3	3.5	9.1	7.3
C-21	173.7	2700	25	6.8	81.0	1.8	23	7.3
C036	172.0	2800	25	6.0	82.1	1.0	930	7.2
C-39	162.7	2900	27	6.8	84.3	1.2	430	7.2
C-44	152.4	2900	27	6.4	79.3	1.0	36	7.2
			September 8, 1948					
C-18	182.7	4100	26	7.8	94.9	0.9	3.6	6.7
C-20	175.1	4000	25	7.8	92.9	1.5	3.6	7.3
C-21	173.7	4000	25	7.6	90.5	1.3	9.1	7.4
C-36	172.0	4100	26	4.6	56.0	1.6	430	7.4
C-45	146.6	3800	28	6.0	75.8	1.2	15	7.2

NOTE: It is believed that the results from Station C-36 do not reflect stream conditions following reasonable mixing and dilution.

PELL CITY TO LAY LAKE

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 18, 1948					
C- 55	122.9	5000	26	7.0	85.1	1.2	7.3	7.4
C- 79	112.1	5600	25	7.0	83.4	2.6	28	7.3
C- 99	86.4	6200	26	7.0	85.1	1.6	93	7.5
C-100	74.3	6200	28	7.2	90.9	2.8	43	7.5
C-101	68.0	6200	28	7.0	88.4	2.4	23	7.5
			August 19, 1948					
C- 55	122.9	5500	27	6.8	84.3	2.8	-	7.5
C- 79	112.1	6000	26	6.8	82.7	1.0	43	7.5
C- 99	86.4	6200	27	7.2	89.2	1.8	9.1	7.5
C-100	74.3	6200	28	7.2	90.9	0.6	15	7.5
C-101	68.0	6200	28	7.2	90.9	1.0	93	7.5
			August 27, 1948					
C- 55	122.9	3700	28	6.2	73.8	1.6	4.3	7.4
C- 79	112.1	4000	28	6.2	78.3	1.4	75	7.4
C- 99	86.4	4100	29	7.4	95.2	1.2	24	8.2
C-100	74.3	4300	29	7.6	97.8	0.6	150	7.9
C-101	68.0	4300	29	7.6	97.8	0.8	9.1	7.9
			September 8, 1948					
C- 55	122.9	3600	28	6.8	85.8	1.0	24	7.3
C- 79	112.1	3900	27	6.4	79.3	1.6	3.6	7.4
C- 80	95.8	3800	27	6.2	76.8	1.0	3.6	7.4
C- 99	86.4	3700	27	7.4	91.6	0.8	23.0	7.5
C-100	74.3	3700	27	7.4	91.6	1.4	240	8.1
C-101	68.0	3700	27	7.8	96.6	1.0	3.6	8.1
			September 13, 1948					
C- 55	122.9	3700	25	6.8	81.0	0.7	9.1	7.5
C- 73	112.1	3900	25	7.0	83.4	1.1	23	7.5
C- 80	95.8	4000	24	6.4	75.0	0.8	-	7.4
C- 99	86.4	4100	25	7.2	85.8	0.8	3.6	7.6
C-100	74.3	4300	21	7.8	86.6	1.2	-	7.3
C-101	68.0	4300	27	7.8	96.6	0.4	-	7.3

(Pell City to Lay Lake-Cont.)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			September 14, 1948					
C- 55	122.9	3700	25	6.4	76.2	0.8	4.3	7.4
C- 79	112.1	3900	25	6.6	78.6	1.0	23	7.4
C- 80	95.8	3800	24	7.2	84.4	0.6	9.3	7.4
C- 99	86.4	3800	25	6.2	73.8	0.4	0.91	7.6
C-100	74.3	3900	26	7.8	94.9	0.8	3.9	7.3
C-101	68.0	3900	26	7.0	85.1	0.6	0.73	7.3
			September 17, 1948					
C- 55	122.9	3200	25	6.4	76.2	1.2	24	7.5
C- 79	112.1	3400	24	6.4	75.0	1.0	23	7.4
C- 80	95.8	3500	24	6.4	75.0	0.6	1.1	7.5
C- 99	86.4	3600	24	6.8	79.7	0.8	2.9	7.5
C-100	74.3	3700	25	6.0	71.5	1.4	9.3	7.3
C-101	68.0	3700	26	5.6	68.1	1.2	0.91	7.3
			September 22, 1948					
C- 55	122.9	2800	26	7.2	87.5	1.0	23	7.5
C- 79	112.1	3000	25	6.0	71.5	1.2	23	7.5
C- 80	95.8	3000	25	6.0	71.5	1.2	2.3	7.5
C- 99	86.4	3000	25	7.6	90.5	1.0	2.3	7.5
C-100	74.3	3000	27	7.4	91.6	1.0	-	7.3
C-101	68.0	3000	27	7.4	91.6	1.4	-	7.6
			September 23, 1948					
C- 55	122.9	2700	26	7.0	85.1	1.6	1.5	7.5
C- 79	112.1	2900	25	6.8	81.0	1.0	9.3	7.5
C- 80	95.9	2900	25	6.4	76.2	0.6	7.5	7.5
C- 99	86.4	3000	25	6.4	76.2	0.6	24	7.5
C-100	74.3	3000	26	7.6	92.4	1.6	4.3	7.9
C-101	68.0	3000	26	7.6	92.4	1.0	23	7.9
			September 27, 1948					
C- 55	122.9	2300	22	7.6	86.0	1.4	4.3	7.5
C- 79	112.1	2500	22	6.2	70.2	1.6	2.3	7.5
C- 80	95.8	2600	21	6.0	66.7	1.8	9.3	7.5
C- 99	86.4	2700	22	7.0	79.2	1.4	0.73	7.6
C-100	74.3	2700	24	7.4	86.8	2.2	2.3	7.7
C-101	68.0	2700	24	6.2	72.7	4.3	0.8	7.7

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
				June 28, 1949				
A-1	308.3	19000	26	6.6	80.3	1.0	36	7.1
A-3	307.9	19000	26	7.2	87.5	1.0	930	7.1
A-4	305.9	19000	26	7.2	87.5	1.0	91	7.2
A-5	302.3	19000	26	7.2	87.5	0.8	150	7.1
A-6	301.0	19000	26	7.0	85.1	0.8	36	7.1
A-7	300.0	19000	27	6.8	84.3	2.2	930	7.2
A-8	298.5	19000	27	6.8	84.3	2.4	430	7.1
A-9	297.5	19000	27	6.8	84.3	1.0	---	7.1
A-10	294.4	19000	27	6.8	84.3	1.0	230	7.1
A-11	293.0	19000	28	6.8	85.8	1.0	2,100	7.1
A-12	291.6	19000	28	6.8	85.8	1.0	230	7.1
A-18	287.2	20000	28	6.0	75.8	0.8	430	7.1
A-19	285.4	20000	28	6.0	75.8	0.8	2,400	7.1
A-26	285.0	20000	28	7.0	88.4	2.8	91	7.1
				July 5, 1949				
A-1	308.3	18000	27	6.6	80.3	1.0	36	7.1
A-3	307.9	18000	27	6.4	79.3	2.0	36	7.1
A-4	305.9	18000	27	6.0	74.4	0.9	36	7.1
A-5	302.3	18000	28	6.2	78.3	1.1	36	7.2
A-6	301.0	18000	28	6.2	78.3	1.4	---	7.1
A-7	300.0	18000	28	6.2	78.3	1.4	---	7.1
A-8	298.5	18000	28	6.2	78.3	1.1	230	7.1
A-9	297.5	18000	28	6.2	78.3	1.1	750	7.2
A-10	294.4	18000	28	6.2	78.3	0.9	230	7.1
A-11	293.0	18000	28	6.2	78.3	1.1	91	7.1
A-12	291.6	18000	28	6.0	75.8	1.1	91	7.1
A-18	287.2	18000	28	6.0	75.8	0.9	73	7.1
A-19	285.4	18000	28	6.0	75.8	0.9	230	7.1
A-26	285.0	18000	28	5.6	70.7	1.1	36	7.1

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MONTGOMERY & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			July 7, 1940					
A-1	308.3	18,000	27	6.8	84.3	0.8	1,100	7.2
A-3	307.9	18,000	27	6.2	76.8	1.0	43	7.1
A-4	305.9	18,000	28	6.8	85.8	1.2	240	7.3
A-5	302.3	18,000	28	6.8	85.8	0.2	1,100	7.1
A-6	301.0	18,000	28	6.8	85.8	0.4	460	7.1
A-7	300.0	17,000	28	5.6	70.7	0.8	460	7.1
A-8	298.5	17,000	28	6.8	85.8	0.8	1,100	7.1
A-9	297.5	17,000	28	6.8	85.8	0.8	460	7.1
A-10	294.4	17,000	28	6.8	85.8	0.4	210	7.1
A-11	293.0	17,000	28	6.8	85.8	0.8	240	7.1
A-12	291.6	17,000	28	6.8	85.8	1.0	460	7.1
A-18	287.2	18,000	28	6.8	85.8	1.0	---	7.1
A-19	285.4	18,000	28	7.0	88.4	1.0	460	7.1
A-26	285.0	17,000	28	7.0	88.4	0.8	93	7.1
			July 12, 1949					
A-1	307.3	18,000	26	6.8	82.7	0.8	36	7.1
A-3	307.9	18,000	26	6.8	82.7	0.4	72	7.1
A-4	305.9	18,000	26	6.8	82.7	2.2	91	7.1
A-5	302.3	18,000	27	6.8	84.3	1.0	91	7.1
A-6	301.0	18,000	27	6.8	84.3	1.0	91	7.1
A-7	300.0	18,000	27	6.8	84.3	1.0	30	7.1
A-8	298.5	18,000	27	6.8	84.3	0.8	230	7.1
A-9	297.5	18,000	27	7.0	86.8	0.8	210	7.1
A-10	294.4	18,000	27	6.8	84.3	1.2	210	7.1
A-11	293.0	18,000	27	6.8	84.3	1.2	430	7.1
A-12	291.6	18,000	27	6.8	84.3	1.0	91	7.1
A-18	287.2	19,000	27	6.8	84.3	1.2	750	7.1
A-19	285.4	19,000	27	7.0	86.8	1.2	36	7.1
A-26	285.0	19,000	27	7.0	86.8	0.8	230	7.1

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MONTGOMERY & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 1, 1949					
A-1	308.3	18,000	25	7.2	85.8	1.2	4,600	7.0
A-3	307.9	18,000	25	7.2	85.8	0.8	---	6.9
A-4	305.9	17,000	25	7.4	88.1	0.6	---	6.9
A-5	302.3	17,000	25	7.4	88.1	0.6	36	6.9
A-6	301.0	17,000	25	7.2	85.8	1.2	9.2	6.9
A-7	300.0	17,000	25	7.4	88.1	0.8	230	6.9
A-8	298.5	17,000	25	7.4	88.1	0.6	930	6.9
A-9	297.5	16,000	25	7.2	85.8	0.6	430	6.9
A-10	294.4	16,000	25	7.2	85.8	0.8	430	6.9
A-11	293.0	16,000	25	7.2	85.8	0.8	430	6.9
A-12	291.6	16,000	26	7.2	87.5	1.0	91	6.9
A-18	287.2	16,000	26	7.2	87.5	0.6	91	6.9
A-19	285.4	16,000	26	7.2	87.5	0.8	36	6.9
A-26	285.0	16,000	26	7.4	90.0	0.8	430	6.9
A-29	275.8	19,000	27	7.0	86.8	0.8	43	6.9
A-33	246.3	19,000	27	7.0	86.8	1.6	23	6.9
			August 2, 1949					
A-1	308.3	16,000	25	7.0	83.4	0.8	36	6.9
A-3	307.9	16,000	25	6.4	76.2	0.4	---	6.9
A-4	305.9	17,000	25	6.8	81.0	0.6	36	6.9
A-5	302.3	17,000	25	6.8	81.0	0.4	91	6.9
A-6	301.0	17,000	25	6.6	78.6	0.4	36	6.9
A-7	300.0	17,000	25	7.0	83.4	0.4	91	6.9
A-8	298.5	17,000	25	6.8	81.0	0.4	91	6.9
A-9	297.5	17,000	25	7.0	83.4	0.6	230	6.9
A-10	294.4	18,000	25	7.0	83.4	0.2	91	6.9
A-11	293.0	18,000	25	7.2	85.8	0.4	430	6.9
A-12	291.6	18,000	25	7.2	85.8	0.4	36	6.9
A-18	287.2	18,000	25	7.2	85.8	0.6	---	6.9
A-19	285.4	18,000	25	7.2	85.8	0.6	91	6.9
A-26	285.0	18,000	25	7.2	85.8	0.4	36	6.9

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MONTGOMERY & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 3, 1949					
A-1	308.3	15,000	25	7.0	83.4	0.8	36	6.9
A-3	307.9	15,000	25	7.0	83.4	0.4	460	6.9
A-4	305.9	15,000	25	7.0	83.4	0.4	43	6.9
A-7	300.0	16,000	25	6.8	81.0	0.6	150	6.9
A-8	298.5	16,000	25	7.2	85.8	0.4	93	6.9
A-9	297.5	16,000	25	7.2	85.8	0.4	460	6.9
A-11	293.0	16,000	25	7.4	88.1	0.6	75	6.9
A-18	287.2	17,000	26	7.2	87.5	0.6	43	6.9
A-19	285.4	17,000	25	7.0	83.4	0.8	43	6.9
A-26	285.0	17,000	25	7.2	85.8	0.6	150	6.9
A-29	275.8	18,000	25	7.2	85.8	1.0	240	6.8
A-33	246.3	18,000	25	7.2	85.8	0.8	23	6.8
			August 4, 1949					
A-1	308.3	14,000	26	7.0	85.1	0.4	36	6.9
A-2	307.9	14,000	26	7.0	85.1	0.6	23	6.9
A-5	303.3	15,000	26	6.8	82.7	0.8	23	7.0
A-6	301.0	14,000	26	7.0	85.1	0.8	39	6.9
A-7	300.0	14,000	26	7.0	85.1	0.8	460	6.9
A-10	294.4	15,000	27	7.0	86.8	0.6	---	6.9
A-12	291.6	15,000	26	7.0	85.1	0.6	150	7.0
A-18	287.2	15,000	27	7.0	86.8	0.4	93	6.9
A-19	285.4	15,000	27	5.8	71.9	0.4	93	7.0
A-26	285.0	15,000	26	5.4	65.7	0.6	93	6.9

MONTGOMERY & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./ sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 5, 1949					
A-1	308.3	15,000	26	7.0	85.1	0.4	9.1	6.9
A-3	307.9	15,000	26	7.0	85.1	0.6	9.1	6.9
A-4	305.9	15,000	26	6.8	82.7	0.4	23	6.9
A-7	300.0	14,000	26	7.0	85.1	0.4	23	6.9
A-8	298.5	14,000	26	6.8	82.7	0.4	210	6.9
A-9	297.5	14,000	27	6.8	84.3	0.4	460	6.9
A-11	293.0	14,000	27	7.0	86.8	0.4	93	6.9
A-18	287.2	14,000	26	6.8	82.7	0.6	21	6.9
A-19	285.4	14,000	26	7.0	85.1	0.4	93	7.0
A-26	285.0	14,000	26	6.8	82.7	0.4	460	6.9
A-29	275.8	15,000	27	6.6	81.7	0.8	460	6.9
A-33	246.3	15,000	25	7.0	83.4	0.8	39	6.9
			August 8, 1949					
A-1	308.3	14,000	27	6.6	81.7	0.8	9.1	7.1
A-3	307.9	14,000	27	6.8	84.3	0.6	15.0	7.1
A-4	305.9	15,000	27	6.6	81.7	0.2	43	6.9
A-7	300.0	15,000	27	6.8	84.3	0.4	23	7.1
A-8	298.5	15,000	27	6.8	84.3	0.8	460	7.1
A-9	297.5	15,000	27	6.6	81.7	0.8	460	7.1
A-11	293.0	16,000	28	7.0	88.4	0.8	43	7.1
A-18	287.2	16,000	28	7.0	88.4	0.8	15	7.1
A-19	285.4	16,000	28	7.0	88.4	0.4	75	7.1
A-26	285.0	16,000	27	7.0	86.8	0.4	93	7.1

MONTGOMERY & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 9, 1949					
A-1	308.3	14,000	27	6.4	79.3	0.8	43	7.0
A-3	307.9	14,000	27	6.4	79.3	0.4	460	6.9
A-5	302.3	14,000	27	6.4	79.3	0.6	93	6.9
A-6	301.0	14,000	28	6.6	83.4	0.2	43	6.9
A-7	300.0	14,000	28	6.6	83.4	0.6	460	7.0
A-10	294.4	14,000	28	6.4	80.8	0.6	460	7.0
A-12	291.6	14,000	28	6.4	80.8	0.4	460	7.0
A-18	287.2	14,000	28	6.4	80.8	0.4	93	7.0
A-19	285.4	14,000	28	6.6	83.4	0.6	460	7.0
A-26	285.0	14,000	28	6.4	80.8	0.6	460	7.0
A-29	275.8	15,000	26	5.2	63.2	1.0	240	7.3
A-33	246.3	15,000	27	7.2	89.2	0.8	43	7.0
			August 10, 1949					
A-1	308.3	14,000	27	6.8	84.3	0.8	23	6.9
A-3	307.9	14,000	27	6.8	84.3	0.4	23	6.9
A-4	305.9	14,000	27	6.8	84.3	0.8	43	6.9
A-7	300.0	14,000	27	6.6	81.7	0.8	23	7.0
A-8	298.5	14,000	27	6.8	84.3	0.8	240	7.0
A-9	297.5	14,000	28	6.8	85.8	1.0	240	7.0
A-11	293.0	14,000	28	6.6	83.4	0.8	460	7.0
A-18	287.2	15,000	28	6.8	85.8	0.6	43	7.0
A-19	285.4	15,000	28	6.8	85.8	0.6	460	7.0
A-26	285.0	15,000	28	6.8	85.8	0.8	460	7.0

MONTGOMERY & VICINITY (Cont)

Sampling Sta.	Miles from Mouth	Ave. Disch. cu.ft./sec.	Temp. °C	D.O. ppm	D.O. % Saturation	B.O.D. ppm	Coliform MPN/ml	pH
			August 11, 1949					
A-1	308.3	13,000	27	6.6	81.7	0.2	3.6	6.9
A-3	307.9	13,000	27	6.8	84.3	0.4	240.	6.9
A-5	302.3	13,000	27	6.8	84.3	0.8	75	6.9
A-6	301.0	13,000	27	6.8	84.3	0.8	93	6.9
A-7	300.0	14,000	27	6.8	84.3	0.6	150	6.9
A-10	294.4	14,000	27	6.6	81.7	0.6	460	7.0
A-17	291.6	14,000	28	6.8	85.8	0.6	93	6.9
A-18	287.2	15,000	28	7.0	88.4	0.6	240	7.0
A-19	285.4	15,000	27	7.0	86.8	0.2	460	6.9
A-26	285.0	15,000	27	7.0	86.8	0.4	43	6.9
A-29	275.8	15,000	28	7.0	88.4	1.2	240	7.0
A-33	246.3	15,000	27	7.0	86.8	1.2	43	6.9
			August 12, 1949					
A-1	308.3	13,000	26	6.8	82.7	0.2	43	6.9
A-3	307.9	13,000	26	6.6	80.3	0.4	43	6.8
A-4	305.9	13,000	27	6.4	79.3	0.4	75	6.9
A-5	302.3	13,000	27	6.6	81.7	0.4	9.1	6.9
A-6	301.0	13,000	27	6.6	81.7	0.4	460	7.0
A-7	300.0	13,000	27	6.6	81.7	0.6	43	7.0
A-8	298.5	13,000	28	6.4	80.8	0.6	1,100	6.9
A-9	297.5	13,000	28	6.8	85.8	0.2	93	6.9
A-10	294.4	13,000	28	6.6	83.4	0.2	1,100	6.9
A-11	293.0	13,000	28	6.6	83.4	0.4	93	6.9
A-12	291.6	13,000	28	6.8	85.8	0.6	240	6.9
A-18	287.2	13,000	28	6.6	83.4	0.6	460	6.9
A-19	285.4	13,000	28	6.8	85.8	0.6	240	6.9
A-26	285.0	13,000	28	6.8	85.8	0.4	93	6.9

TABLE A-2

DESIGNATION AND LOCATION OF SAMPLING STATIONS
HOWELL MILL SHOALS RESERVOIR INVESTIGATION

Station	River Mileage	Description
C-18	C182.7	Coosa River on Hoke's Bluff Ferry 9 miles above Gadsden
C-19	C176.4	Coosa River 3 miles above Highway Bridge at Gadsden
C-20	C175.1	Coosa River 2 miles above Highway Bridge at Gadsden
C-21	C173.7	Coosa River 1/2 mile below Highway Bridge at Gadsden
C-36	C172.0	Coosa River below mouth of Big Wills Creek
C-37	C171.4	Coosa River 1/2 mile below Big Wills Creek
C-38	C168.5	Coosa River 3 1/2 miles below Big Wills Creek
C-39	C162.7	Coosa River bridge at Gilberts Ferry
C-44	C152.4	Coosa River on Greensport Ferry
C-45	C146.6	Coosa River on Ferry near Chatchee
C-55	C122.9	Coosa River bridge U. S. Highway 78 near Lincoln
C-79	C112.1	Coosa River at Stemley
C-99	C 86.4	Coosa River bridge Highway 91, Childersburg
C-100	C 74.3	Coosa River 12 miles below Childersburg
C-101	C 68.0	Coosa River 18 miles below Childersburg
C-114	C 10.6	Coosa River Highway Bridge Wetumpka
C-115	C 5.2	Coosa River Ft. Toulouse 5 miles above mouth
A-1	A308.3	Alabama River 1/4 mile above branch from sewer outfall. Gunter Field.
A-3	A307.9	Alabama River 1/4 mile below branch which receives sewage from Gunter Field
A-4	A305.9	Alabama River 200' above L & N R. R. Bridge

Station	River Mileage	Description
A-5	A302.3	Alabama River 1/4 mile above Tyler Goodwyn Highway Bridge
A-6	A301.0	Alabama River 1 mile above Railroad Station Montgomery
A-7	A300	Alabama River at R. R. Station, Montgomery
A-8	A298.5	Alabama River 1 1/2 miles below R. R. Station Montgomery
A-9	A297.5	Alabama River Boat Dock Maxwell Field
A-10	A294.4	Alabama River 5 1/2 miles below R. R. Station Montgomery
A-11	A293.0	Alabama River 1 1/2 miles above Bridge U. S. Highway 31
A-12	A291.6	Alabama River between Bridge U. S. Highway 31 and G M & O R. R. Bridge
A-18	287.2	Alabama River 1/4 mile below mouth of Autauga Creek
A-19	A285.4	Alabama River 1/4 mile above mouth of Catoma Creek
A-26	A285.0	Alabama River 1/4 mile below mouth of Catoma Creek
A-29	A275.8	Alabama River 10 miles below mouth of Catoma Creek
A-30	266.8	Alabama River 1 1/2 miles below Swift Creek
A-33	246.3	Alabama River Benton